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THE POISONOUS CONSTITUENT OF THE BARK OF ROBINIA PSEUDACACIA.

By Frederick B. Power.

In a recent publication by Professor R. Kobert, of the University of Rostock, Germany, entitled: "Beiträge zur Kenntnis der vegetabilischen Haemagglutinins," which has been reprinted from a memorial volume of the *Landwirtschaftliche Versuchs-Stationen,* Band lxxix–lxxx, some very astonishing statements have been made respecting the protein of the bark of *Robinia Pseudacacia,* Linné. This protein substance was first obtained by me in the summer of 1889, and the fact that it possesses the well-known poisonous properties of the respective bark was conclusively shown in a paper read before the Wisconsin Academy of Sciences, Arts and Letters on December 27, 1889, which was also published in the *Pharm. Rundschau,* New York, 1890, **8,** 29–38. In a subsequent communication (*Pharm. Journ.,* London, 1901, **67,** 258) I had shown that this protein, to which in the meantime Kobert had assigned the name *robin,* possessed enzymic properties, and that it was capable of hydrolyzing both amygdalin and sinigrin (potassium myromate) with the production respectively of bitter almond oil and mustard oil, as also of clotting milk. In the last-mentioned paper consideration was taken of a statement in a dissertation by one of Professor Kobert's pupils, namely, Dr. Carl Lau (Rostock, 1901), whereby it was intimated that the toxic action of the Robinia protein had first been established by him. The exact statement by Dr. Lau (*loc. cit.,* p. 259) was as follows: "*Ich würde sehr gern noch eingehendere Versuche darüber eingestellt haben, ob die giftige Eiweisssubstanz der Robinienrinde ein Albumin, eine Albumose, oder ein Globulin, oder ein Gemisch zweier Substanzen ist. Zu*

derartigen Versuchen hätte ich jedoch viel grössere Mengen von Material gebraucht als sie mir zur Verfügung standen. Ich musste mich daher damit begnügen festgestellt zu haben dass es sich thatsächlich um eine giftige Eiweisssubstanz handelt." In another place, with the incorrect assumption that I had assigned to the Robinia protein a name (*robinin*) which might cause it to be confused with the coloring matter of Robinia flowers, Lau remarked: *"Man wird daraus ersehen, wie zeitgemäss es war, unsern Giftstoff aus der Robinie in Robin umzubenennen."*

It will be seen from the above quotations that in 1901 the poisonous action of the Robinia protein was recognized by Professor Kobert and his pupil, and in this connection it seems desirable to repeat what I had recorded in 1901 (*loc. cit.*, p. 259) that some time after having obtained the poisonous protein from Robinia bark I sent a specimen of it to the late Professor Flückiger, of Strassburg, and in a letter from him under the date of February 4, 1892, which is still in my possession, he wrote as follows: "I have to thank you for the poison of Robinia, which I sent finally to Prof. Kobert, Dorpat (Russia). He has also prepared the poison, and states now that it nearly agrees with your preparation."

In view of all the well-known facts, which have been so completely substantiated, concerning the toxic action and other properties of the Robinia protein, it is difficult to understand how Professor Kobert could now have been led to make such obviously incorrect and misleading statements on this subject as are contained in the recent, above-mentioned publication. He there notes (*loc. cit.*, p. 82) that he has repeated his own experiments, and must withdraw the statements made together with Lau respecting the poisonous action of robin, those statements being now regarded by him as attributable to the impurity, imperfect solubility, or the immoderately large doses of the preparation used at that time. The preparation more recently employed by him, while acting energetically on some kinds of blood, was found not to be poisonous for rabbits when injected subcutaneously in amounts of 1 to 10 c.c. of a 0.4 per cent. solution. He therefore concludes that the symptoms of poisoning produced in man and animals by Robinia bark cannot be referred to robin, but presumes that the poisonous principle is the alkaloid or glucoside of the bark. Having thus inferred from the results of the above experiment that robin cannot be regarded as poisonous in small doses, he concludes that he must

place it in the group of "phasins," or non-poisonous agglutinants.

Some still more surprising statements are made by Professor Kobert (*loc. cit.*, p. 83), which may literally be translated as follows: "For distinguishing the robin of Robinia bark from ricin the property of hydrolyzing sinigrin, as found by Power, would be admirably adapted, as this is not otherwise possessed by a single vegetable agglutinin. Experiments have shown, however, that Power's statements are not valid for the robin of Robinia bark prepared by me (Kobert) and preserved in a dry state. It does not hydrolyze sinigrin even by its action for two days in an incubator and does not otherwise possess the property of hydrolyzing glucosides. It also has no coagulating effect on milk."

It is exceedingly unfortunate that Professor Kobert should have given such prominence to the results of experiments from which thoroughly incorrect inferences are liable to be drawn, especially by those who cannot conveniently repeat them, and he does not seem to have considered it necessary to ascertain the cause of his failure to obtain the results recorded by me. As the subject is one of considerable importance, I have deemed it desirable to present such facts as are believed to be sufficient to prove the incorrectness of Professor Kobert's conclusions, and to substantiate in every respect the accuracy of the statements previously recorded by me regarding the toxic action and other properties of the protein of Robinia bark.

In the first place it was noted in my paper on this subject in 1890 that a decoction made by boiling 100 grammes of the bark with water was taken without any ill effect or any perceptible action, whereas a cold infusion of about 5 grammes of the bark was in one instance so violent in its action as nearly to prove fatal. It was thus evident that the activity of the poisonous substance was destroyed at the temperature of boiling water, and this observation suggested not only the protein nature of the substance but also the method subsequently employed for its isolation. Moreover, the protein material, as precipitated by alcohol from the liquid obtained by macerating the ground bark with cold water, when collected, washed with alcohol, and dried in a vacuum or over sulphuric acid, possessed the same poisonous properties as the bark. When administered to a large dog in an amount representing about 30 grammes of the bark, it caused severe vomiting, which continued at intervals for several hours, and a considerably smaller quantity

was not without effect. A solution of the same substance, when heated sufficiently to coagulate the protein, was quite devoid of activity. As the above experiments had been conducted with a bark collected by myself at Madison, Wisconsin, it may be noted that some years subsequently a quantity of protein material was prepared from Robinia bark collected in France. This protein material, when isolated by the simple method above described, possessed the same toxic properties as that previously obtained. It is well known that substances of this character lose their activity to a greater or less extent on keeping, even in a dry state, and that they also undergo change in this respect when their purification is attempted by methods of repeated solution and precipitation or by subjecting them to dialysis. Some change of this nature may have taken place in the material employed by Professor Kobert for his recent experiments, and this would appear to be the most probable explanation of the results now obtained by him, which, moreover, are so completely at variance with his own earlier observations.*

As a specimen of the Robinia protein which had been prepared by myself in 1904 was still available, it was deemed of interest to ascertain whether it still retained its original toxic properties. It was therefore kindly tested with respect to its activity by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories. An amount of 0.25 gramme was administered by the mouth to a dog, when, after an interval of about an hour, it produced two attacks of vomiting. This result, together with the observations previously recorded, as noted above, clearly demonstrate that *the poisonous constituent of Robinia bark is a protein.* They certainly lend no support to the statement of Professor Kobert that the respective protein, or robin, is a non-poisonous "phasin," or to his presumption that the activity of the bark is due either to an alkaloid or a glucoside.

There remains to be considered the statement of Professor

* Since writing this paper I have been favored with a private communication from Professor Kobert, in which he informs me that his method of testing the hydrolytic action of robin was by mixing a 1 per cent. solution of the protein with a 1 per cent. solution of sinigrin, and observing the result after keeping the mixture for some time, either at the room temperature or at a temperature of 38° C. It is not surprising that under these conditions no odor of mustard oil was perceptible. Apart from the extreme dilution of the robin solution employed, it is probable that in the preparation of the latter the active portion of the protein had been removed.

Kobert (*loc. cit.*, p. 83) that the robin, or protein material prepared by him was not capable of hydrolyzing sinigrin, and possessed in fact no hydrolyzing action on glucosides, nor did it coagulate milk. His failure to obtain positive results in these experiments was certainly due to no inaccuracy in my observations, as would thereby be implied. Since the receipt of his publication I have again tested in this direction the above-mentioned specimen of robin which was prepared in 1904, and had thus been kept, in well-stoppered bottles, for a period of nine years. This material was both in the form of dark brown scales, as originally obtained on drying the precipitated protein, and in the form of a lighter-colored powder, which was produced at the same time by triturating the first mentioned product. These two forms of the preparation were separately tested, both with amygdalin and with a well-crystallized specimen of sinigrin (potassium myronate) in the following manner: Into a small test-tube, provided with a well-fitting cork, was brought a small quantity of the respective glucoside, together with some of the dry protein, and a little water subsequently added. The tubes being then corked, and the mixtures vigorously shaken, they were set aside at the ordinary temperature (16–18° C.) and occasionally agitated. After a period of about 24 hours or less the tubes were opened, when in the one case there was a strong odor of bitter almond oil, and in the other an equally distinctive, sharp odor of mustard oil. The unmistakable results of these tests, which are doubtless obtained much more quickly with the fresh Robinia protein, thus not only confirmed my previous observations, but they have now also been confirmed independently by five chemists in these laboratories. It was not deemed necessary to again repeat the test with milk, the coagulation of which by the protein, or an enzyme therein contained, I had previously fully and accurately described.

The properties which the protein material designated as " robin " has been shown to possess renders it probable that, like other similar products, it is a mixture of substances, but no method is known to the present author by means of which a separation of its constituents could be effected without a corresponding loss of activity. It is also not known whether the toxic action of the protein is due to a substance which at the same time possesses enzymic properties, but as the last-mentioned properties are so varied in character, no doubt can be entertained respecting the presence of several

enzymes. Apart from the frequently observed occurrence of enzymes, or mixtures of such, which effect the hydrolysis of amygdalin, it has been ascertained by Th. Bokorny (*Chem. Zeitung.*, 1900, **24**, 771) that myrosin or a similar ferment is also widely distributed, having been found in plants of many different families besides the *Cruciferæ*, although the glucoside (sinigrin) which yields mustard oil has as yet only been found in the last-mentioned family. A milk-clotting enzyme, or phytochymase, has also been stated to occur in various plants.

The confusion which is likely to be produced in the literature in consequence of the recent statements published by Professor Kobert is much to be regretted, especially as his conclusions, which appear to have been too hastily formed, are so obviously and demonstrably wrong. It is for this reason that I have deemed it my duty to again place on record the above-mentioned facts, as also to maintain that the observations noted in my previous publications (*Pharm. Rundschau*, 1890, **8**, 29, and *Pharm. Journ.*, 1901, **67**, 258) respecting both the toxic action and enzymic properties of the protein ("robin") of Robinia bark are perfectly correct.

THE WELLCOME CHEMICAL RESEARCH LABORATORIES,
London, E. C.

THE NATURE AND STRUCTURE OF COCHINEAL.*

BY HENRY KRAEMER.

The cochineal insect is indigenous to Mexico and Central America and in general appearance resembles a wood louse. It is usually found growing upon certain flat-stemmed forms of the Cactus family, chiefly species of Nopalea. The red dye found in the remains of the female insect has been long esteemed by the old races in these sub-tropical countries. Indeed, not only did they appreciate its value, but in order to increase the supplies, the cacti with the insects were successfully cultivated many years before even Cortez landed in Mexico in the early part of the sixteenth century. The real nature of cochineal, however, was not known until some time after the introduction of the commercial article into Europe. In 1530 Acosta[1] concluded that it was of animal origin. It was

*Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

FIG. 1.

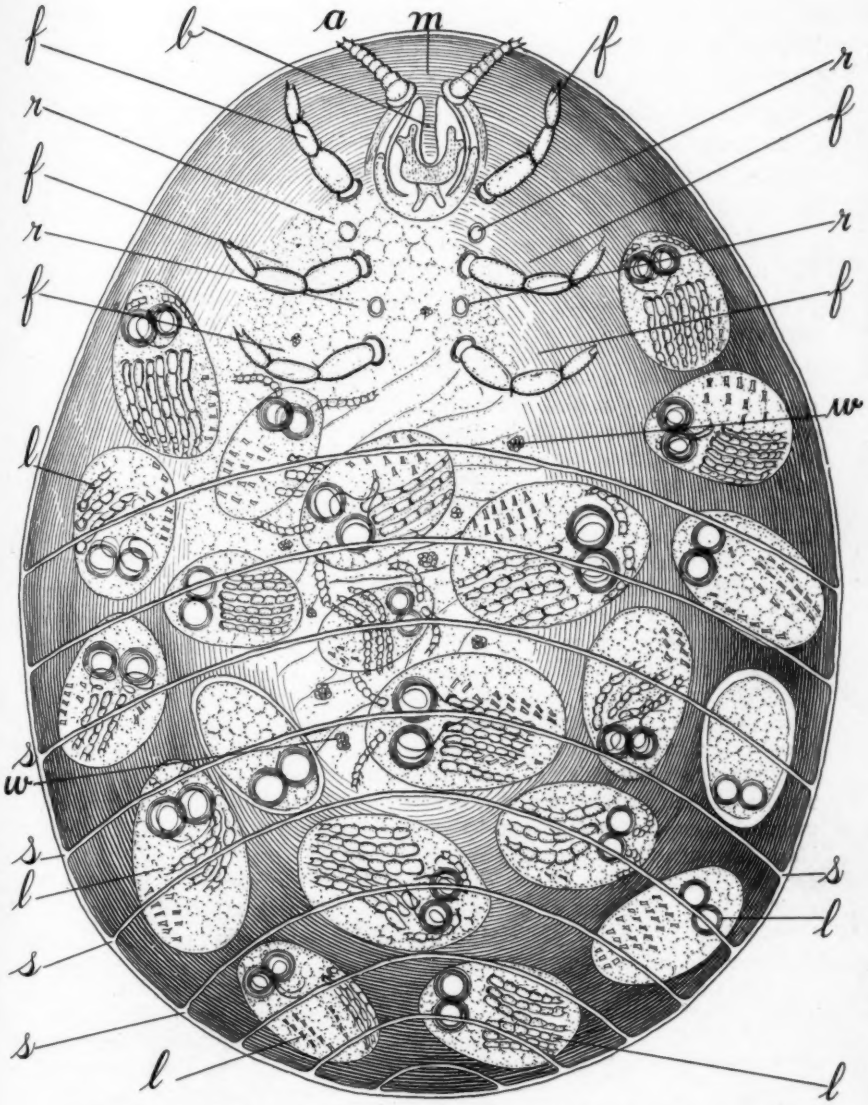


Diagram of cochineal insect of commerce showing an ovoid sac-like membraneous cradle enclosing numerous young larvæ (*l*). Parts of the mother insect: *m*, mouth part; *b*, beak or proboscis; *a*, antennæ; *f*, three pairs of legs; *r*, respiration channels or breathing pores; *s*, segments in abdominal region; *w*, wax-pores.

supposed, however, by many others to be in the nature of a vegetable product and spoken of as a fruit or berry. Even as late as the early part of the eighteenth century a controversy waged in Holland as to whether cochineal was of animal or vegetable origin. This was finally settled apparently by that great pioneer microscopist, Antonius van Leeuwenhoek, who rather conclusively showed it to be of animal origin.

Leeuwenhoek's article on Cochineal was written probably during the latter part of the seventeenth century. It will be found in a chapter in a large work, entitled "Select Works of Antony van Leeuwenhoek," translated by Samuel Hoole. A copy of this book is in the Public Library of New York City. Leeuwenhoek [2] in this article says:

"When I first applied myself to investigate the nature of cochineal, I concurred in the general opinion which then prevailed that it was the fruit of some tree; and having at the request of the Honorable Mr. Boyle further prosecuted the examination, each single piece or fruit, as I then thought it, appeared to contain one hundred or upward of what semed to me to be very small seeds, shaped like eggs, each enclosed in its particular membrane; these objects, however, I could not bring into view, until the cochineal had lain in water for some hours, and then the outer skin being taken off, these apparent seeds which were very soft presented themselves; the membrane was filled with a watery substance, of a lovely red, but the seeds were of a dark red or tawny color. The seeds themselves, upon being dissected, appeared to consist of nothing but very minute globules of a red color.

"The remainder of the cochineal, or that part of it which enclosed all these seeds, was composed of very thin membranes, which were also of a red color, except that a very small quantity was to be seen of a certain colorless substance, which to me had the appearance of an oil. And to give an idea of the general appearance of the figure of cochineal, I know not any manner of expressing it, better by comparison, than with a parcel of dried black currants with their skins and seeds, regard nevertheless must be had for the different sizes of the currants and the cochineal. Lastly when I divided the membranes or seeds of which cochineal appeared to consist, into as thin portions or particles as I was able, those thin particles did not as I may say, exhibit any particular color.

"The preceding observations I communicated by letter to Mr. Boyle, from whom I received an answer to the following effect: that he had understood from the Governor of Jamaica that cochineal was produced from the fruit of the fig-tree,* when in a state of decay, at which time there proceeded

* Mylius [9] (*loc. cit.*) mentions "Indian Fig" as a synonym for the Nopal plant on which the cochineal insect is found. The fruits of the Mexican Opuntia (*Nopalea coccinellifera*) are commonly known as the "prickly pear" and hence the plant is sometimes referred to as "fig tree."

from thence certain maggots or aurelias which changed into flies; that these flies settling on the trees were then killed by making fires under the trees, the smoke of which caused them to fall down; after which they were stripped of their heads, the fore parts of their bodies, and their wings, and the remainder preserved for use, so that cochineal was properly and in truth the hinder part or tail of a fly, and consequently, that my observations were so far correct that the substance I had seen were really eggs, such as are found in the hinder part of the silk-worm's moth.*

"To this I replied, that in my preceding observations, it was impossible for me to judge, that cochineal was an animal substance, because there was nothing to be seen in it that resembled an animalcule, and I concluded that if it had been an animal, it would have been devoured by those animalcules, called mites; and I added, that in consequence of the information communicated by the Honorable Mr. Boyle, in his letter I had repeated my observations, the result of which as I communicated them to him is as follows:

"On this renewed investigation of the subject, I was fully convinced that every single grain of cochineal was part of an animalcule from which not only the head, the fore part of the body, and the wings, had been broken off, but that also the legs, and that part of the body to which the legs are joined had been thrown away, so that nothing was left, except the animal's hinder part; and I imagined that the colorless substance before mentioned, and which was to be observed in the chinks or creases in every grain, was some preparation, applied to the cochineal, when it is collected for sale, to defend it from mites, which otherwise would destroy or devour it.

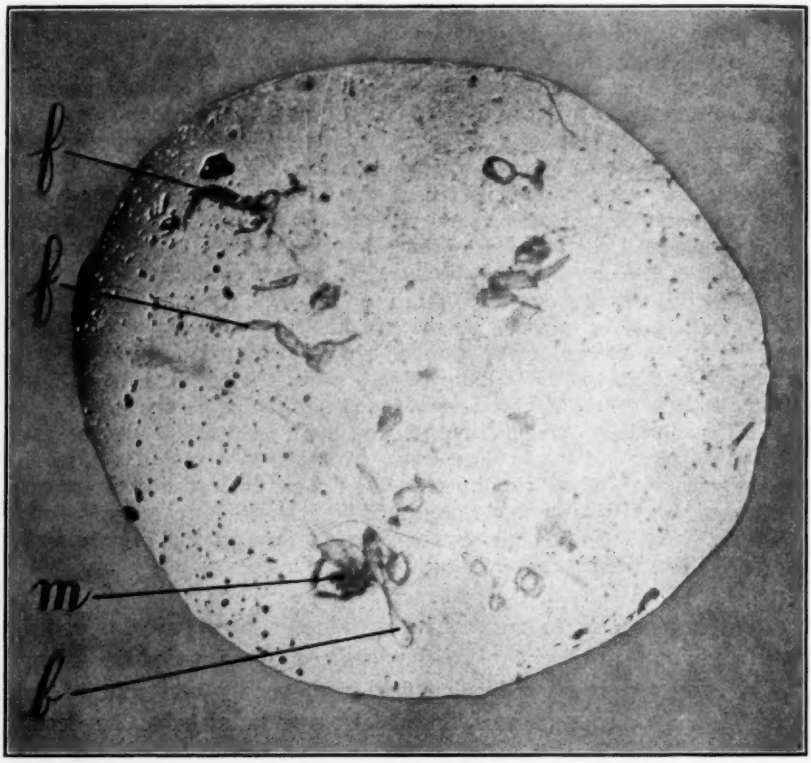
"These creases or rings, in every grain of cochineal, I imagine are, the articulates or joints, in those kinds of maggots or caterpillars, which afterward change into a flying insect; and I did not doubt, that at the proper season, when a similar kind of insect could be found in this country I should establish the fact, allowing only for the difference for shape and color between them, and those which constitute cochineal."

He then goes on to say that he examined a large parcel of cochineal and found in it several of the shells or coverings of the wings, which shells were of a black color, with each a red spot in the middle. He also mentions finding fragments of what he terms aurelias which he concluded were formed from the maggots or caterpillars of this species, and in one of them was a piece of a maggot, which, in part, seemed to have been devoured by a mite.

*It is doubtful if by the methods that Leeuwenhoek used in clearing his material that he actually saw the eggs or larvæ. Certainly if he was able to see the larvæ he would have seen the mouth parts and legs of the mother insect and not come to the conclusion that the cochineal of commerce represented only the hind portions of the insect. This may be readily confirmed by examining the microphotographs of the cochineal of commerce, Figs. 2 and 3.

He further compared cochineal with a small flying insect called by the children "lady-birds," and which are found when the white nettles are in bloom. The latter were killed, and taking off their wings, feet and heads he found that the cavity that is seen on every grain of cochineal, is on the back or upper side of the animalcule

FIG. 2.



Microphotograph of cochineal insect of commerce showing: *b*, partially extended beak or proboscis; *m*, mouth portion; *f*, two of the legs still intact.

and is caused by the drying; that part of the grain which appears with a kind of rifing (ridging?) is the lower part or belly. As to those grains in cochineal, which have smaller cavities than others, I conclude that they must have been female insects, whose bodies being filled with eggs do not admit of their contracting in so great a degree; and though the hind parts of the bodies of these insects which compose cochineal do somewhat differ from those of the lady-birds,

yet I was now more than ever assured that not only the insect which produces the cochineal, but also those others which I have just mentioned, are formed from maggots or caterpillars.

Leeuwenhoek then ascertained that the rings or creases which occur in the commercial cochineal are accidentally produced in the drying, and concludes that the cochineal insect is composed of fourteen joints, rings, or articulations. Furthermore he says that after he left the grains of cochineal in water for twenty-four hours or more he observed that the cavity which had been caused by the drying, was swelled and extended to its original shape, so that the grains appeared exactly to agree, in form and make, with the hinder part of those insects whose wings and bodies are covered with shells or cases. While in some respects, considering the time when they were made, Leeuwenhoek's observations seem nothing short of remarkable, it is probably nearer the truth when we say that he was a fortunate observer with unusual insight. He had a scientific mind and used his reasoning faculties with remarkable success, so that many of his observations form the starting point for very much scientific work. Since his time the male and female insect have been described and they are illustrated in a number of works on entomology as well as in some of the encyclopedias. The best illustrations of the male and female insects will be found in the article by Raphael Blanchard.[20]

Before taking up the structure of the insect it may be well to say something about its position among insects and to consider some of the facts known concerning its developmental history.

Cochineal Insect and its Habitat.

The cochineal insect belongs to the order *Hemipteræ*, suborder *Homoptera*, Family *Coccidæ*. The latter includes the scale-like insects which are characterized by the fact that the wingless female dies shortly after producing her eggs, the latter being covered up by her dead scale-like body.[3] In the case of the cochineal insect the larvæ are found, as will be shown later on, within her inflated body. In the group of the *Coccidæ* we find a number of interesting scale insects. Here we find the lac insect from which stick-lac of commerce is produced, the latter being a resinous substance excreted by a species of *Coccus* (*Carteria*) *lacca* which inhabit the branches of several tropical trees. From the bodies of these in-

sects also certain coloring agents known as "lac dyes" are produced. China wax, the excretion of an insect known as "Pela" (*Ericerus pela*) is also the product of a scale insect belonging to this family. Comstock[4] states that there are many species of the *Coccidæ* which excrete wax in considerable quantity. While some of the members of this family produce useful products, others are among the most injurious of insects. Some of our citrus fruit trees, as the orange, are very much injured by the scale insect *Aspidotus aurantii*. The San José scale, causing serious damage to very many of our fruit trees, is also produced by a scale insect, *Aspidotus perniciosus*.[5]

The cochineal insect was first described by Hernandez in 1651. It is ordinarily in scientific works referred to as *Coccus Cacti* Linné. In the eighth edition of the U. S. Pharmacopœia the name was changed to *Pseudococcus Cacti* (Linné) Burmeister. In a "Catalogue of The Coccidæ of the World," Maria E. Fernaldo[6] gives preference to the name *Dactylopius Coccus* Costa. In Pharmacopœial work we are justified however in using the Latin title that has been given precedent by usage, namely *Coccus Cacti*, as otherwise we might change the name with each revision as our knowledge of these insects is extended.

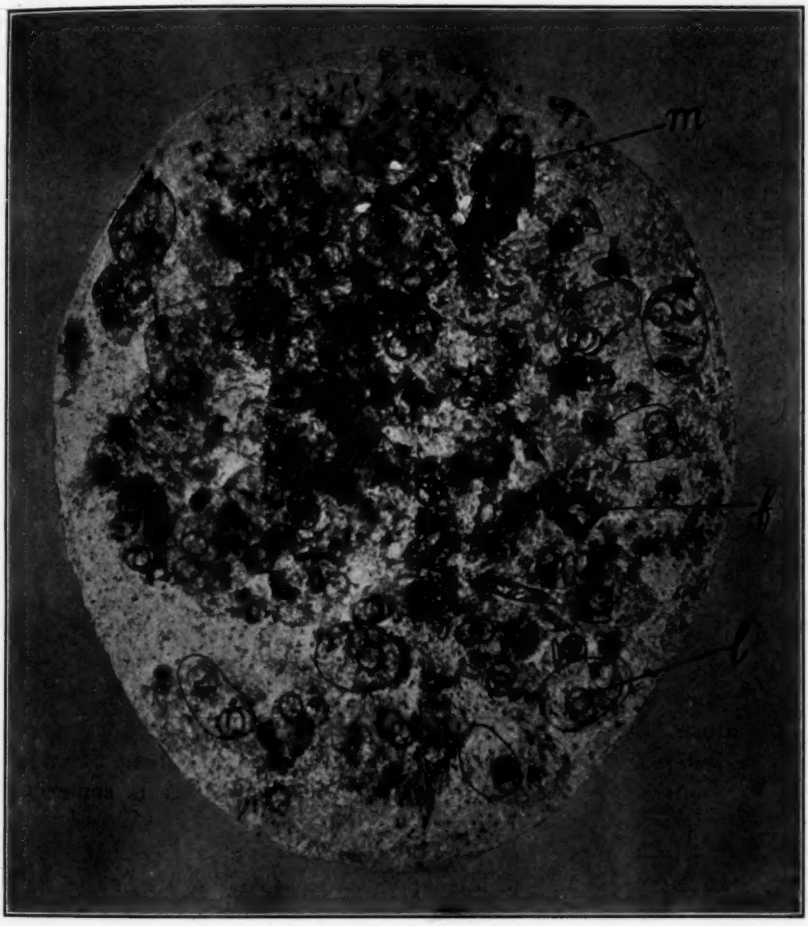
The cochineal insect feeds upon various species of the *Cactaceæ*, more especially the Nopal plant, *Nopalea* (Opuntia) *coccinellifera* (Mill.) S.-Dyck, a native of Mexico and Peru. It has spread into other parts of South and Central America and has been introduced into the West Indies, East Indies, Canary Islands, Southern Spain, Algeria, and is said to be found in Florida and California. Whether the occurrence in the last two places is accidental or with a view of developing the cochineal industry I cannot state.

Cultivation of Cochineal.

The cultivation of cochineal is rather simple in a tropical climate, all that is necessary is to have the cochineal insects and the proper cacti. Senor Santiago da Cruz e Goncalves,[7] a surgeon established in Teneriffe over sixty years ago and who was appointed by the Spanish Government to superintend the cultivation of cochineal in that island, wrote an interesting article on "The Cultivation of Cochineal." This was translated with some additional notes by G. J. de Nobrega in *The Pharmaceutical Journal*,

1848–9, pp. 342–348. In this article there is also an interesting note on the Madeira Nopal as well as the cochineal insects growing on the opuntias in this locality. In a line drawing in this article of

FIG. 3.



Microphotograph of cochineal insect of commerce showing: numerous larvæ (*l*) each with the characteristic beak or proboscis in the form of two dense spiral coils. The mouth part, *m*, and portions of the legs (*f*) of the mother insect are also shown.

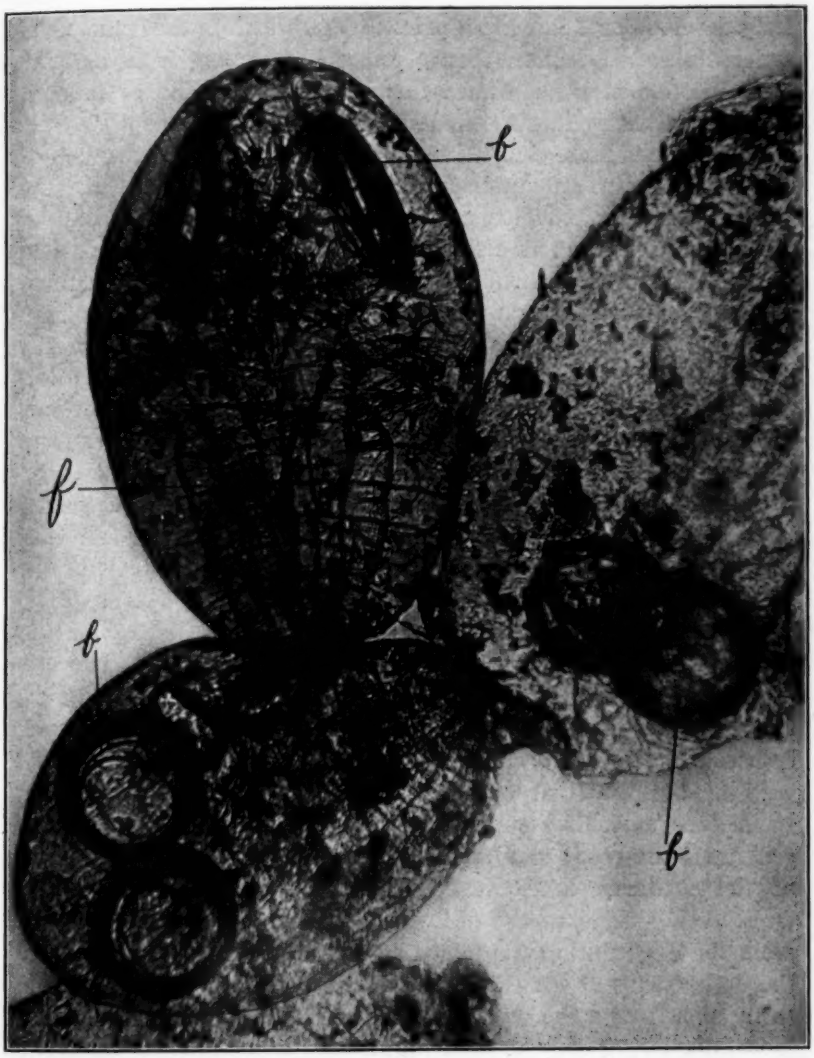
de Nobrega there is shown the stem of an opuntia on which are several broods of cochineal. The best illustrations, however, showing the Nopal plants and cochineal insects are those given in the

article by Blanchard [20] already referred to. In this connection the article on "The Culture of Cochineal in India," by Dr. Roxburgh [8] in the AMERICAN JOURNAL OF PHARMACY, 1842, pp. 137–145, may be of considerable interest. C. J. Sage [17] has recently published a note on the cultivation of cochineal in the Canary Islands, from which most of our commercial supplies are now obtained. Probably the most complete work on the distribution and cultivation of the cochineal insect is by de Ruuscher which was translated into German by Mylius [9] in 1751 and is included in his work entitled "Physikalische Belustigungen." In speaking of the culture of cochineal insects he says, all that is necessary is for one to raise small nests upon potted Nopal plants growing in the house. Then when they are ready to propagate, the insects are transferred to the Nopal plants growing in the fields. In a few days the female lays her eggs, dying shortly thereafter. The young develop under the mother and when mature they creep up the Nopal stems seeking always the juiciest and greenest parts. Recently there has been published by Leon Diquet [21] an article on "The History of The Cochineal Insect of Mexico," and which contains a number of illustrations of the Nopal plantations as well as very much information concerning the cultivation of cochineal in that country.

LIFE HISTORY OF COCHINEAL INSECT.

In going over the literature we find more or less fragmentary and even contradictory accounts of the life history of the cochineal insect. The development should be further studied upon living material. The following facts based upon an examination of the literature as well as my own studies of the dried insect may be of some interest. The female insect is without wings, about 2 mm. in length and consists of from 9 to 12 segments. It is somewhat globular, becoming later distinctly ovoid. In general appearance, as it creeps over the cactus stems, it is convex on the upper, that is the dorsal surface, and somewhat flattened or concave below, that is on the ventral surface. It is covered with glaucous dust being a coat of wax. This wax is a protective secretion and is formed as a glandular secretion by the "wax pores" (Fig. 1, *w*) and wax hairs (Figs. 5 and 6), the anatomy of which has been worked out by Mayer.[10] It is therefore formed very differently in *Coccus Cacti* from the other members of the *Coccideæ*, in which it is secreted

FIG. 4.



Microphotograph of several of the numerous larvæ found in the mother insect and in which are to be seen the characteristic beaks (*b*); and the three pairs of legs (*f*) still enclosed in the sac-like membrane of one of the larvæ.

by a pair of tubular processes located in the fifth abdominal segment. The antennæ are rather short, consisting of 8 parts. The threadlike beak or proboscis, forming a sucking apparatus, is very fully developed. There are 3 pairs of legs which in the commercial article do not show more than 3 joints. Projecting from the posterior portion of the abdomen there are 2 short hairs or bristles, which are wanting in the commercial article.

The male is more elongated and ellipsoidal in outline and is provided with 2 perfectly transparent wings which reach beyond the extremity of the abdomen and cross each other longitudinally on the back. The head is distinguished from that of the female in being furnished with a rudimentary beak and with 2 long feathery antennæ. It is said that the male insect is reproduced in large numbers; the larvæ in the commercial cochineal does not show this to be the case. As a matter of fact, actually only one male is necessary for about 300 females. Upon performing their functions the male insects die and are blown away. They are therefore never seen in the commercial article.

The female insect after fecundation grows larger as the young larvæ develop, becoming eventually about twice her original size. She meanwhile attaches herself to the surface of the stems of the cacti, her body penetrating into the upper layer of cells. The upper or dorsal surface becomes more or less cartilaginous in structure and more or less convex in shape. The lower surface is drawn toward the upper surface and in this membraneous cradle the larvæ are developed. It requires about eight days for the larvæ to become full grown, when they are said to resemble the parents with the exception that they are covered with a short hairy coating. In another week they attain maturity and the females of the new generation are ready to form broods in their turn. The life history of the cochineal insect is completed in about six weeks, two weeks being required for the development of the mature insect from the egg; during the next two weeks the female crawls over the fleshy stems of the cacti, the male in the meanwhile being able to fly about; then the female attaches herself to the tissues of the Nopal plants, her body becoming a membranous cradle for the larvæ of the next generation, and after which she dies. From three to five generations of the cochineal insect may be produced in a single year. The first generation usually is richer in coloring matter and is considered the most valuable. It is estimated that from an area of

about an acre of Nopal plants approximately 100 kilos of cochineal may be gathered; this would represent about 14,000,000 of the membranous cradles with larvæ, or the dried insects of commerce.

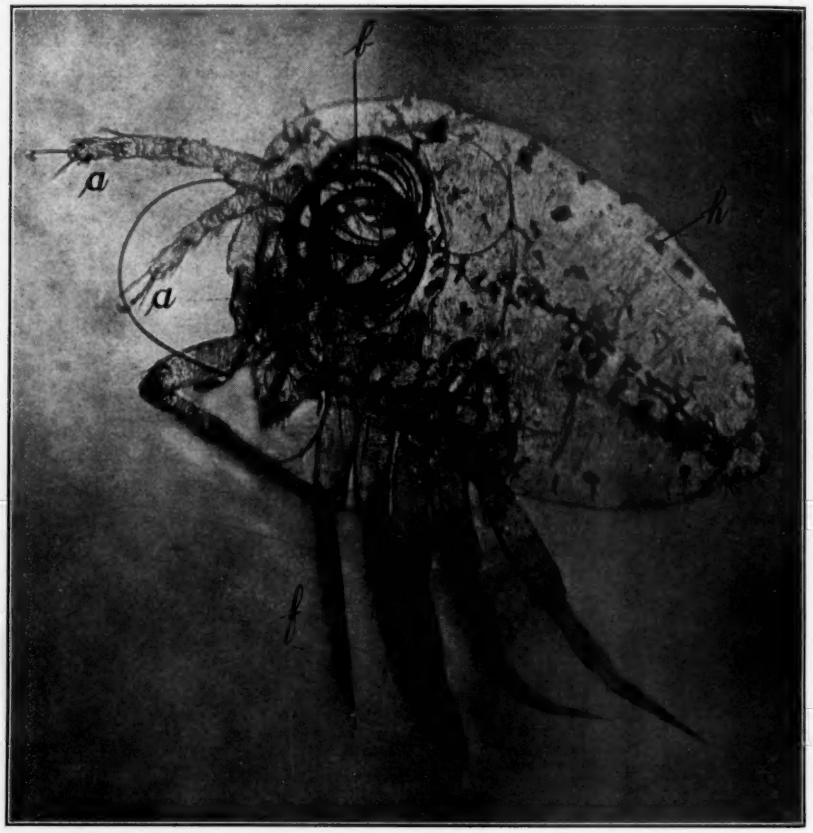
The Structure of the Cochineal Insect of Commerce.

The cochineal of commerce consists of the membranous cradle of the female which is removed by the planters from the Nopal plants. They are then subjected to steam or hot water and dried, or they may be dried by direct heat as will be referred to later. These processes it has been supposed are necessary in order to kill the female, as a matter of fact it is really the larvæ within her which are destroyed, as will be seen from the illustrations used in this paper. Before one can study the nature and structure of the commercial article, which is of a dark garnet color and very opaque, it is necessary to remove the coloring matter. This is best done by taking a convenient quantity of the cochineal, say about 10 Gm. and macerating it with 100 c.c. of water containing 2 or 3 per cent. of an alkali. The mixture is allowed to stand for an hour or so, the contents being poured over a piece of wire gauze. The insects remain on the gauze and are then washed with a few litres of water. The insects, from which the coloring matter has been partly removed, are then transfered to 150 c.c. of hydrogen peroxide solution and allowed to stand for a few hours with occasional gentle stirring. The mixture is again transferred to the gauze, the excess of hydrogen peroxide being washed off and the insects transferred to a weak alkali solution in which they are macerated for six or eight hours. The mixture is poured upon the wire gauze and washed with water until the filtrate runs practically colorless. The insects on the gauze are then transferred to dilute alcohol to which a few drops of hydrochloric acid have been added. This now renders them translucent and ready for microscopical study. They may be mounted in chloral solution or a solution of chloral and glycerin and examined.

The material which has been cleared in this way shows the cochineal insect to be a hollow vesicle of an ovoid or plano-convex shape having in the upper portion some of the remains of the mother insect (Fig. 1). The mouth part with a more or less developed beak or rostrum is always present, the beak sometimes being extended and recurved in a narrow elliptical form in the direction

of the abdomen (Fig. 2). One or both of the antennæ are frequently present, showing 5 to 7 parts. The joints of the legs are usually more or less detached, the point of insertion usually only being indicated by large yellowish-brown elliptical areas. In be-

FIG. 5.



Microphotograph of larva in cochineal insect of commerce showing: outspreading antennæ (*a*) and feet (*f*); the characteristic beak or proboscis (*b*); and wax-hairs on the body (*h*).

tween each of the legs on both sides are situated 2 distinct pores, resembling in form and color the point of attachment of the legs, and which are tracheæ or respiration canals. Covering the body we find on surface view numerous small groups of cells with thick yellowish-brown walls. When seen in section they are more or less conical and traversed by open canals. These have been studied

by Mayer [10] on living material and termed by him "wax-pores." In the body of the insect, especially those in which the larvæ are very young, there are usually seen somewhat broad, more or less vermiform segments running more or less transversely or obliquely and these may represent portions of the digestive tract (Fig. 1). In the abdominal region which is very large the larvæ are borne (Figs. 1, 3), and these usually are seen to be in several stages of development.

The larvæ vary on an average from about 300 to 500 microns in length. When the antennæ and legs have emerged the larvæ are more than 1 mm. in length. When very young they are more or less ellipsoidal or ovoid and very soon are characterized by a pair of coils which are closely wound and form the beak or rostrum (Fig. 4). These coils represent the proboscis or sucking apparatus and are frequently seen uncoiled or protruding (Fig. 6) and are composed of 4 threadlike parts which pair off into 2 coils, the one surrounding the other. The inner pair of these threads forms the sucking apparatus while the outer acts as a cutting instrument. By means of this long threadlike proboscis the insect is enabled to penetrate the thick tissues of the cactus plant and obtain the necessary nourishment. The body is otherwise covered with short conical hairs about 20 microns in length, the apex being truncate. Microscopic mounts usually show in the abdominal region of the larvæ numerous crystals in the form of rods or spherical aggregates, and which are probably wax crystals. In older insects when the legs have more or less protruded the antennæ are usually more or less outspreading (Fig. 5). The legs vary from 400 to 600 microns in length and consist of from 3 to 8 segments, the lower pair having the greater number. They are provided at the joints with a few bristlelike hairs which vary from 25 to 60 microns in length. The antennæ are about 200 microns in length and consist of from 6 to 8 parts, being like the legs somewhat bristly hairy at the joints. The body of the matured young insect shows the numerous wax-pores already referred to as occurring on the mother and also in the lower abdominal region a differentiation into 9 or 10 segments (Figs. 3–5).

The Red Coloring Principle.

The red coloring principle, carminic acid, is found apparently altogether in the larvæ enclosed in the body of the mother insect. This is present to the extent of about 10 per cent. Accord-

ing to Mayer [10] it occurs in drops near the periphery of the cells of the fatty body, the drops being less numerous in the case of the male insect. It also occurs in the yolks of the eggs and in the diffuse fatty body in the new hatched larvæ. Mayer says that the pigment does not occur in the gut, but in another place he states that it moderately colors the feces, which anomaly he does not attempt to explain. It is possible that he may mean that the pigment is not found in the anterior part of the gut, but is introduced into it by the Malpighian tubules. As to function of the carminic acid Mayer has no suggestion to offer, but is of the opinion that the pigment is intrinsic and not derived. On the other hand, Krukenburg [11] considers that the carminic acid is a reserve product, basing his opinion on the theory that the female contains this principle in from 26 to 50 per cent. of her body weight. He also considered the pigment to be of a glucosidal nature, and expresses the view that glucosides are in the nature of reserve principles. But it has since been shown [14] that the coloring principle in cochineal is not a glucoside. Marion I. Newbigin [12] states that it is impossible to decide the question of the function of the coloring principle of cochineal as yet, but that the association of a pigment in the cells of a fatty body is not unknown among other insects and mentions the case of *Luciola*. Mayer also describes a colorless crystalline substance occurring in the cells containing the red pigment but does not discuss the nature of these crystals. Newbigin states that they may be urates and if so the contrast between the pigmentation of the sexes in *Luciola* and *Coccus* is striking in the extreme. As a matter of fact the colorless crystals are probably of the wax, coccerin, and are quite common in preparations made for microscopic work as has already been pointed out.

While the theory of Mayer in regard to the function of carminic acid is probably nearer the truth, Gierke [13] states that the coloring substance in cochineal is produced in the body of the insect and appears to be in the form of a uniform purplish-colored sap. He found this sap on microscopical examination to be nearly colorless and to contain numerous small purplish-colored granules to which he ascribed the color.

Throughout the literature there are very many statements that the same coloring principle found in *Coccus Cacti* is present in other species of Coccus. This is considered to be doubtful and requires confirmation. It is rather interesting to note that while the wider

distribution of carminic acid in the animal kingdom is being denied it would seem that a principle resembling carminic acid is found in the flowers of horsemint, *Monarda didyma*.[16] Reference should also be made to the monograph on "Monardas" by Nellie Wakeman.[22]

Commercial Varieties of Cochineal.

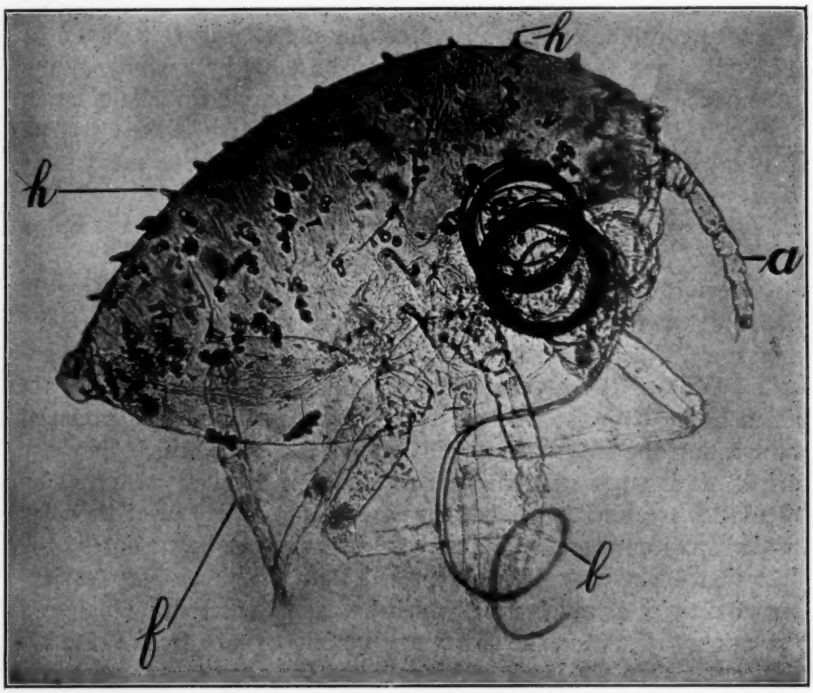
While the author of this article is hoping for fresh material with which to continue certain phases of this investigation, it should be said that there is very much that can be done by a study of the commercial article. It is rather easily prepared for examination and with the use of stains it may be possible to study the complete anatomy of the insect and distinguish the male from the female larvæ. Furthermore it is not at all unlikely that different lots will show varying development of male and female larvæ and a very great difference in tinctorial value.

There are quite a number of grades of the commercial article and it is usual to distinguish but two grades which are said to be due to a difference in the manner of killing the insects. In the so-called "Silver Gray Cochineal," the freshly collected insects are killed by heat direct; whereas the "Black Cochineal" is produced by treating the insects first with hot water, after which they are dried. It is supposed that part of the wax has been removed by this latter treatment and that the silver gray variety owes its color to the waxy excrescence. This would seem to be borne out by the fact that Liebermann[14] has reported that the silver gray variety contains twice as much wax, which he named coccerin. He found the amount of wax in the silver gray variety to vary from 1.0 to 2.0 per cent., while the black cochineal gave from 0.5 to 1.0 per cent., and in one sample 1.5 per cent. of coccerin. A specimen marked "Granilla" yielded 4.2 per cent. of wax.* While these facts are doubtless true it will be found that the coating on the gray cochineal consists chiefly of mineral matter, as was first observed by Leeuwenhoek.[2] If a few of the grains of the commercial article are heated upon a slide it will be found that the grayish coating scales off and is not destroyed by further incineration upon the lid of a platinum crucible. It is insoluble in water, chloral solution or benzole and

*I am inclined to the opinion that it will be subsequently found that the "silver-gray cochineal" consists of the mother insect with more immature larvæ and that in the "black cochineal" the larvæ are more fully developed.

gives a very slight effervescence with hydrochloric acid. The ash of cochineal has been reported to consist of oxides of aluminium, calcium, magnesium, sodium, potassium, iron, tin, and phosphorus, but which of these elements are naturally in the insect and which are added has not been determined. When these facts are known

FIG. 6.



Microphotograph of mature larva in cochineal insect of commerce showing the beak or proboscis extended and ready for penetrating the tissues of the cactus; *a*, antennæ; *f*, feet; and *h*, wax-hairs covering the body.

a qualitative test for the elements in the adulterant would be sufficient to exclude inferior grades.

Gierke [13] calls attention to the fact that there is considerable difference in the quality of the commercial article, depending upon the locality in which the insects are cultivated, which crop of the season is harvested and the manner in which the insects are killed.

The most valuable variety is known as "Madres" and represents the first brood of the season. This corresponds to the variety formerly known as "Zacatillo," which was exported from Mexico.

At one time Honduras shipped the best commercial article. At the present time, according to Holmes,[15] the greater quantity comes from Teneriffe, one of the Canary Islands. Other supplies come probably from Guatemala and possibly Honduras and Mexico. At one time good cochineal also came from Vera Cruz, Java and Spain.

According to the fancy of the broker or exporter several grades of cochineal are recognized. Holmes says: "Broadly speaking, the terms 'Silver grain,' 'black grain,' and 'granilla' are used, but there are intermediate qualities variously designated as gray, black-gray, silver-gray, silver-black, rosy-black, red and foxy, and these again may be qualified by the terms fair, bold, fine and so forth. The so-called original grains consist of female and young insects, and the latter when sifted out form granilla,* which is only worth one-sixth or one-eighth of the price of the mature insect. The color is due to the mode of preparation for the market. If dried in trays in the sun, or in an oven at a moderate temperature (about 65° C.) for four or five hours, and subsequently in the sun, the waxy substance is not melted and the silver grain is the result. If they are dried at a higher temperature than 106° C., the melting point of the wax on hot iron plates, the black-grain is the result. The red tint of the rosy-black is said to be produced if they are put in bags and dipped in boiling water to kill them before drying, and that of the foxy silver grain is produced by sifting the insects when not perfectly dried so that some of the coloring matter tinges the surface. The black grain usually obtains a higher price than the silver grain. Both the black and silver grain are sometimes adulterated to meet the demand for a cheap article. The black grain is sometimes met with having the concave side filled with grains of a magnetic iron sand. The silver grain is said to be weighted with sulphate of barium or carbonate of lead and the very white appearance is given by powdered talc or other white powder."

These facts with regard to the preparation of the commercial article are given, as a knowledge of these will readily explain why

* The commercial variety known as "granilla" represents probably nothing more than the smaller females in which the larvæ have shown but a very slight development. It is self-evident from what has been stated in this paper that the larvæ are enclosed in the abdomen of the mother insect and could not be separated by sifting. This view is also supported by the observations of G. A. Shaw.[16]

all the varieties in commerce may not give the same results. Attention should be directed to the fact that the cochineal of commerce may contain extraneous inorganic substances. One will also find short isolated pieces of the spines, and fragments of the stems of the cacti attached to the mother insect.

These studies show that cochineal is the dried remains of the female insect *Coccus Cacti* (Fam. *Coccidæ*) enclosing her young larvæ. When properly cleared, the mother insect is more or less ovoid or plano-convex and for the most part nearly transparent and within her body are from about 20 to 40 larvæ in different stages of development (Fig. 1). The larvæ each have a characteristic beak or rostrum in the nature of two spiral dense coils and when mature the 2 antennæ and 3 pairs of legs are seen protruding.

I acknowledge the services of Philip F. Fackenthall for assistance in the experimental part of this paper.

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THE NEW DRUGSTORE[1]

By F. B. Kilmer

Revisiting the city where, as an errand boy, I entered service, I found but one store that had retained its former location. Of the men who, in my time, had followed this calling not one remained in the trade; they had sold out, retired, died or moved away. The stores had changed, the men had disappeared—in a few short years the old order of things had passed away.

Is not this instance typical of the general movement in our trade? The old order changes—the apothecary has gone—the doctor-shop is no more. There remain but few places that are classed as pharmacies—in their stead has come a new order of merchants—*the new drugstore.*

Standing in front of the new drugstore the calamity howler shouts:

"Pharmacy is going backward! It is retrograding! It is going downward! It is being ruined, degraded, commercialized and vulgarized!"

This sentiment is pictorially expressed in a recent cartoon, showing a customer in a store, who, beholding the bargains, the knickknacks, the bric-a-brac, the hammered brass—all sorts and kinds of wares—everything except drugs, bewilderingly asks the clerk:

"Will you be kind enough to direct me to a drugstore?"

[1] Read at the annual meeting of the New Jersey Pharmaceutical Association, June, 1913.

It is with regret that we review the fading picture of the old shop. We long again to tread its sanded floors, see its dingy walls and its funereal furnishings. We recall the stale drug-like air, the rows of bottles, bearing mysterious names, holding mystic compounds. The old shop was the centre for gossip and loafing; "Doc," the owner, was esteemed for his wisdom and his urbanity —but all have gone their way. In their place has come a new class of men to fill the needs of a new humanity. These are the Newer Druggists, who are at the helm of the New Drugstore.

Characteristics of the New Store

The modern drugstore is not a new idea—it is merely an evolution of the shop of other days. It may be hard at times to recognize the old within the new—the time honored red globes and the long rows of golden labels have been displaced, but here and there we recognize many of the old traditions and the best of the accepted principles still remain.

The most notable change between the old and the new is the character of the wares and the business methods. Commercial pharmacy, with its hustling business systems, has quite a different aspect from the old corner drugstore. The stress of modern life, keen business competition, have made a striking transformation. We may note a few of them.

The one price system: In a store where I served for a time a book was kept wherein was entered against the name of the customer the price to be charged for articles that were most frequently purchased, and each customer had a different price. When a new customer entered he was looked over, the goods were looked at, the clerks looked wise and guessed at a price; special arrangements, secret prices, bargaining, haggling, subterfuges and extortion were the common practice.

The introduction of the one-price idea, and the education of the public up to it, has been a great moral influence in the world's commerce. For its promulgation and maintenance we are indebted to the department store of the Wanamaker type.

The prevalence and dogged retention of former customs as to prices in the drug trade, has undoubtedly fostered the deep-seated prejudice as to drugstore profits, and no doubt had much to do with the advent of the cut-rate store.

In the modern drugstore business is conducted upon a purely

impersonal basis. There are no favorites—the old and young, rich and poor, are treated alike. In larger stores even the personality of the proprietor or the clerk is of but little influence in making business—it is the method that counts.

Universal in modern business is the principle that the "nimble sixpence is better than the slow shilling." Many customers—volume of business—make it possible to buy in larger quantities and obtain concessions not accorded to the small dealer. The larger store can also increase the variety of the merchandise handled, and the drugstore often expands into a department store.

The cut-rate drugstore has been but an incidental phase in this evolution—the cutter has used the inequitable prices upon patent medicines as a means toward an end. As the department store holds out bargains to attract attention, so the cutter uses low prices on popular articles to bring the customer his way. Low prices are only one factor counting toward success and it is a declining practice in the largest of our modern stores. The cutter is not a philanthropist—the chain store must make profits to exist. A manager of the latter class is on record with the statement that if it costs them 28 per cent. to do business, the profits must exceed this percentage before any dividends can accrue.

Packages all ready to hand over the counter enable the merchant to make completed sales in a shortened time, and it is interesting to watch purchasers rush in and out of the drugstore and witness sales made as rapidly as subway tickets are sold during the rush hour. This counts for volume and a lessened expense per sale.

Of vital importance in modern merchandising is service. In former days, if no customers were at hand, the druggist sat down and waited for them. It was undignified, unethical and sometimes unnecessary for the old-time druggist to advertise; everybody knew him—patrons only sought him in times of distress and in such cases were glad to seek his aid. But now he has become an advertiser—a trade developer—a pusher for business.

The development of advertising in the drug trade is an interesting study. Timidity marked its beginning. "Prescriptions carefully prepared" was about as far as the druggist would go; then came the rush of verbosity, exaggeration and generalities; space was filled with statements supposed to create a sensation, make talk and trap the unwary.

Now the value of sane, cumulative publicity is recognized; space

is filled with clear, concise statements and logical arguments. Advertisements contain information that is intended to compel attention and enlist confidence of customers or friends. Honest straightforward advertising is the substantial development of our trade and our time.

That the New Drugstore does not make appeal altogether upon price, is shown by the following excerpt from a newspaper advertisement of one of them:

"There are many good reasons that cannot fail to appeal to every thinking person, and which should make them decide in favor of our store as the most competent place to be entrusted to fill their physician's prescriptions. Only registered druggists of large experience and the highest standing are allowed to handle them. Every ingredient used is of the highest possible quality and exactly the kind the doctor ordered.

"In purchasing drugs, or chemicals at our store, our customers always receive the best—not only the best as regards quality, but the best in point of store service and lowest in price.

"Every drug, or chemical that we offer for sale is guaranteed to be of the highest standard, bought direct from reliable foreign or domestic producers, as the case may be, under the guarantee that they are of the finest quality.

"After being received by us, samples of every article are sent to our laboratory and there subjected to critical analysis to see if they are of the required high standard. If they are, they are then sent to our counters for sale; if not, they are rejected.

"That's the kind of drugs and chemicals you receive at our store."

The marked change in drugstore practice is exhibited in the window. Twenty-five years ago druggists, as a rule, made but little use of their windows; in many stores windows were small in size and their use was limited to show bottles, jars, fly specks, dirt, and litter. Some one more enterprising than his fellows put in perfumes at Christmas, paints in the Spring, sponges in Summer and licorice root when school opened. Then the patent medicine man came along, saw his chance and filled the vacant drugstore window with dope.

In those days there was no such thing as window displays; no display material, no cutouts, no dummies, no signs. Now we have window decorators, plans, designs, systems. We behold artistic, attention-arresting, sales-producing windows.

The drugstore of to-day has, or should have, an advertising manager—a promotion department from which emanates sales plans and publicity campaigns. The druggist uses pages in the newspaper; he uses billboards, street cars—any and every means by which modern business methods may be promoted to increase and hold his trade.

The New Drugstore must satisfy and hold its customers; a long-established trade, or a proud name will not suffice. A liberal policy, broad gauge methods, the spirit of a perfectly satisfying service, down to the smallest detail, are part of the life and system of the New Drugstore. Clerks, sales people, all hands in fact, must be alive; must be well versed in the goods they handle; and must be accommodating and polite. The tenor of the store's life depends on the good will of the public. Herein lies the strength of the department store and the chain store, and here is revealed their greatest weakness.

The small store can, if it will get in closer touch, gain a stronger hold; it can use what the larger store cannot use—individuality and personal strength that will win and hold patronage. The small store may flourish in spite of all the big fellows can do to prevent.

On the Side of the Consumer

The New Drugstore, in one way or another, gets on the right side of the consumer, with the result that frequently there is a shortage of standing room inside its walls. The new druggist has studied the consumer.

It is related of one astute merchant, who owns several stores, that when selecting a location he stands men at given points who count the passersby, and he makes his selection after analyzing the results. He is after possible customers in quantity and quality, and having chosen the spot has been known to pay a rental for six days equal to that paid by the old-time store for a whole year.

The customer, the ultimate consumer of drugs, has changed most strikingly as to his methods of thought, habits and life. Many things have helped to bring about this change. In twenty years the population of the United States has doubled; in the same time the readers of newspapers and magazines have been multipled by five. The new consumer knows more than he did a few years back; street railways have multiplied by ten and the users of the tele-

phone have increased from a few hundred to many millions. This, in a rough way, shows the ability of the customer to choose the things he wants, and the source from which to obtain his supplies.

The consumer has moved rapidly from the country to the city, in turn becoming a suburbanite, and now he is going back to the land in the shape of a new farmer. The city as a place of homes is passing, and in its place are cliff dwellers in apartment houses, electric railroads and subways.

In the rural counties the new farmer has done away with the candle, the wood fire, the ox-cart and homespun clothes. His premises are electric-lighted and steam-heated; he carries his products to town in a motor car, and he makes his purchases with the aid of the telephone and the parcel post.

The New Drug Consumer is a reader and a thinker, with a new mode of thought. This is reflected in the attitude of the public mind upon problems of every kind—progressive legislation, the tariff, education, religion, public and personal morals and upon ethical standards.

As far as drugs are concerned, the average man of to-day has read more about medicine in his magazine or his newspaper than the doctor of twenty years ago learned in his lifetime. It may be for the good or for the ill of the race that every man is becoming his own physician, but the facts are that at the present day the man whom we meet on the street carries in his vest pocket a bottle of patent medicine, is versed in bacteriology, immunity, sterilization, hygiene, sanitation, diagnosis and treatment. It requires a live drug clerk to cope with the up-to-date consumer.

It is difficult to realize the rapid transformation that may take place in a generation. Changes have taken place in those elements which are directly connected with the drugstore, namely, medicine and surgery. The evolution in these arts has been more marked, more rapid, more revolutionary within the last two decades than in all the other centuries that have gone before.

The New Druggist, who no longer is content to be simply the "Doctor's Cook," has kept pace with every turn of the art. He has kept in the vanguard of the progressing age.

There has come a new humanity, a new audience—a newer, larger consumer. The old store sold only bitters and cordials—castor oil, asafetida and pills—in the new drugstore can be found commodities for every human need.

In no age has the drugstore ever been established upon a more solid, substantial basis than that upon which it stands to-day.

The New Drugstore fills the needs of its patrons and enters into the commercial and economic life of the people who enter its doors. Never did the apothecary shop attain as hearty, as far-reaching an appreciation and popularity as does the drugstore of to-day.

The old apothecary shop was visited only in times of stress, the New Drugstore is thronged with eager shoppers.

What Is in Sight

So many and so frequent are the changes in the trend of trade that it is difficult to forestall the next turn. A brief span of a quarter of a century has brought movements that are almost revolutionary. More and more the drugstore adds to the lines of merchandise—so much so that drugs and medicines have come to occupy only a small space in a variety of stock.

An instance is cited where a stock of drugs was moved to a small room at the side of the store. In the main part of the store there is an elaborate array of china, glass, silver, umbrellas, canes, stationery, ice cream, soda water and a host of other commodities.

The Drugstore is now considered the largest factor in handling stationery, confectionery, cigars and photographic supplies; common adjuncts are fully equipped restaurants and ice cream gardens. When the drug trade complains that the other dealers have encroached upon its province, it may reflect that it has reciprocated.

Prohibition and local option have brought a readjustment in the sale of alcoholic preparations; anti-narcotic laws have very markedly affected the sale of drugstore commodities.

In many stores the sale of liquors has been abandoned voluntarily. A druggist recently stated that he was contemplating discontinuing the sale of commodities, which must be sold under restrictions.

As expenses mount upward, the output must be increased, thus many druggists do not hesitate to take on many lines that promise profit. Sometimes the drugstore is the means by which notable successes have been achieved. The introduction of the Safety Razor was a failure in the cutlery trade—the maker took it over to the drug trade, and the result has been one of the modern marvels.

Many in the trade do not hesitate to take over lines that are ephemeral and transient and bargain days, sales weeks, demonstrations are features of the up-to-date drugstore.

More conservative merchants are inclined to be cautious in handling commodities that will tend to crowd out legitimate established trade; a passing fad—a new fashion—may bring throngs of undesirable customers.

The wise drug merchant still keeps a drugstore and branches out only in lines naturally allied. He finds a greater measure in handling commodities that require skilled handling on the part of the buyer and seller. These are the lines that give greater promise of becoming permanent and in them he is less liable to meet strong competition.

The drugstore is most closely associated with the trend of general medicine and surgery—no one has as yet written down the full measure of the progress in the practise of these arts in our day.

"The leaves of the trees of science have been shaken for the healing of the Nations."

Our time will be forever memorable for the changes that have followed each other with such bewildering rapidity until we know not what to expect next. The Supreme gift in these days is to decrease physical suffering in man, woman and child when stricken either by disease or accident and this gift has wrought a most profound change in pharmacy and in the drugstore.

The Apothecaries' Laboratory has been demolished and in its place we see the chimneys of the manufacturer. The drugstore is the purveyor of ready-made products. Out of a few things have come a bewildering number of substances of claimed therapeutic value; fifty thousand or more of them have come from the tar barrel.

We are already walking with the vanguard of the newer Materia Medica—of "Sero Therapy"—of "Organic Therapy." Serums, toxins and antis, immunizing substances, extracts from horses, cattle, sheep, goats, dogs, rabbits, pigs, fowls, pigeons, rats and mice—fill our catalog which will soon resemble the passenger list of Noah's Ark.

Synthetic chemistry has given us delicate perfumes—dazzling colors—potent drugs.

Prediction points toward a time when the food of our tables

will no longer be gathered from the fields but from the laboratory. In fancy, we may look forward toward a day when out of the test tube life itself will emerge. Man's destiny will be governed by the whirl of the benzine ring. In the drugstore of the future the shelves will need to be wide, broad and long to store the coming medicaments and appliances.

New Avenues of Trade

The modern doctor is either a specialist or a hospital attendant —in the advance of medicine and surgery the family doctor has disappeared and no one has yet arisen who can take his place.

A busy practitioner of my acquaintance says that on an average he sees his patients not more than twice and then only for a fifteen-minute session. His assistants take the blood pressure, examine the urine and note symptoms; for treatment, the patients go into the hands of an operator or nurse.

Nowadays the doctor has neither time nor the inclination to reach the intimate relations that once existed between the family and their physician.

Here may be a field for the coming pharmacist, a source of traffic for the future druggist. Why not become the advisor, purveyor and caretaker of the physical life of the race? This swings the pendulum back to the corner drugstore—the olden centre of wisdom and advice.

Preventive Medicine

One of the brightest spots in the history of the past half hundred years is the achievement of medicine. Heretofore the term "preventive" has been limited to sanitation and hygiene, as applied to contagious diseases, but now the field of its operations include every agency and influence that contribute toward man's uplift—to his moral, ethical and athletic development—his intellectual and physical perfection. The field of preventive medicine is broad and wide enough for the trained mind of the pharmacist to find a work place. It is a field that contains a clientage which will more and more demand commodities from the drugstore. Thus far this province has been inadequately manned, by self-sacrificing practitioners of medicine and philanthropic laymen—the harvest has been plenty, but the laborers have been few.

The world has been made cleaner and life safer by the martyrdom of such great heroes as Carter, Lozier, Agrimonti, Carrel, Reed and McClintoc.

"Greater love hath no man, than that
He will lay down his life for another."

Preventive medicine cannot reach its ideal through the labors of the physician. The physician is trained to diagnose and treat disease—that is all that should be expected of him. To ask a physician to lay aside his life work and engage in a limited way in solving the problems of preventive medicine is to restrict his usefulness and to wrest him from his high calling.

Doctors have, up until now, acted as Health Officers in the community in which they have lived. They have done noble work, but in many instances they were wholly unfitted to perform the duties that the position demanded and time thus given was a loss to their patients and to their profession.

Now we know that every community needs as health executive a broad-minded, trained man; a leader—an educator, who will act as superintendent of health. For such a work few of the ablest physicians, or surgeons are suited, but into it a pharmacist may find a foot-hold.

Consider a few of the activities of preventive medicine:

The prevention of communicable and epidemic diseases.

The elimination of disease-producing features from industries.

The prevention of infant mortality.

Teaching and impelling sanitation, hygiene in personal habits and regard for one's fellows.

Mental hygiene.

Does not this suggest innumerable openings for the practice of pharmacy and for promotion of trade?

A writer tells of a house, constructed in such a way, that the germs of disease can enter only with difficulty and if by any chance they should enter it may be easily cleaned—a disease-proof house is the coming dwelling. Who better than the pharmacist or druggist could equip and maintain such a structure? Soaps, disinfectants, insecticides, dustless dusters, fumigators, sputum cups, scrubbing brushes, lotions and solutions—a host of things from the drug shop will be consumed by the inmates of the new diseaseless home.

The progress of preventive medicine is advanced by means of education, which means publicity and advertising. Who, then, better than the druggist, can lead in the movement against the Great White Plague—the Great Black Plague? Who, better than he, is fitted to use printers' ink to spread the gospel of health and to supply the needs that the propaganda will create?

Pure Food

A phase of the newer mode of living is the movement for purer and better food. The drugstore is the purveyor of food stuff for infants and invalids—why not distribute all kinds of food for all classes of patrons? Packets of pure milk, pure water and pure food can be dispensed as readily as malted milk or candy; certified milk, pasteurized milk, guaranteed milk, involve both chemistry and pharmacy.

Surgery

Many of us who are not yet old can appreciate the evolution and the revolution of surgery in the two or three decades just past. It has moved forward a thousand years in a day. Procedures, startling in character and far-reaching in result, have followed each other in quick succession.

The period ushered in by Pasteur and Lister made a rapid flight from crude antisepsis to asepsis, and in its passage left its impress upon pharmacy and trade. Dressings, apparatus, instruments in new forms and kinds have been evolved and as an outcome the drugstore has developed a most notable trade in cottons, bandages, gauzes and numerous types of dressings. To-day we see the opening of the most brilliant chapter in the history of surgery—we seem to stand in the morning light of a new era.

The dominant idea of the Listerian doctrine has been to prevent the development of bacteria in wounds and to remove the products of infection. Now, the natural resources of the patient are to be considered—he is made to manufacture within himself phagocytes, opsonins, antibodies. The surgeon does but little—the resources of the patient are developed and his tissues can manage infection better than the knife or antiseptics ever did. The surgeon guides—nature heals. Wonderful tales are told of the wizards of surgery, with their operations, grafting, splicing, trans-

planting of organs from one animal to another, of the causing of new cells, new tissues, new limbs to grow. No one can predict the outcome of the wondrous work of Carrel and of his followers, but we can believe that the drugstore will always be the mecca for surgical supplies.

First Aid

First Aid to the Injured is not of modern origin. The recent past has seen a development that is now reaching a high degree of efficiency. First Aid, to-day, is quite different from the early efforts to mitigate the horrors of war. First Aid does not, as is often supposed, train workers to become surgeons, doctors and nurses. It is an educational, humanitarian movement—the dominant purpose of which is to instill in the mind what to do in an emergency or while waiting for medical aid.

Druggists, as a class, have but little comprehension of the development of this movement. The National Government, municipal bodies, civic organizations, schools, Y. M. C. Associations are now practical training schools in the First Aid to the Injured movement. Railway Systems, mining companies, factories, city departments have First Aid Systems in working order. Abroad the movement is very far reaching. In this country it is estimated that, through various channels, a million people are every year acquiring a practical knowledge of the subject. As the soldier has long carried on his person a First Aid Packet—the up-to-date mining and railway employe now does the same. In many transportation systems every car, engine and caboose—every boat carries a quota of supplies and so likewise does the motor car. First Aid has become universal—the time seems to be approaching when people in every walk of life will carry on their person some form of an appliance for the care of an injury. This movement is creating a demand for materials that is within the province of the druggist to supply.

The Newer Pharmacy

In the past pharmacy has been identified with every great advance in civilization. It has been foremost in the progress of medicine and science, and from its ranks have come great physicians, physicists and scientists.

Halberg divided pharmacy into four periods:

First Period: The Organic—or Plant and Animal Period of Hippocrates to Galen.

Second Period: The Alchemic—or Period of the Philosopher's Stone and Confection of Trismegistus to Geber and Basil Valentine.

Third Period: The Iatrochemic—or Period of Medical Chemistry of Paracellus to Scheele.

Fourth Period: The Atomic—or Quantitative Period of Dalton, Lavoisier and Berzelius.

Rapidly advancing we see a Fifth Era—it is not yet formulated or defined, but it is being shaped out of a new philosophy. We catch glimpses of it in newer physics, in radio-activity, physical chemistry, biology and in many new pawns on the chess board of man's struggle with nature.

Modern progress is planted firmly upon machinery—the steam engine—the steam ship—the dynamo—electric communication—the printing press—the conquest of the air—these and all manner of mechanical devices have bred a humanity with larger and higher aims.

There is at hand a new industrial order—the barriers between creeds, race and nations are being broken down—people of all lands are being brought together into a conscious solidarity. There is before us a scientific organization of industry, of politics, of morals—in brief—the whole scheme of our daily lives. From this must come the rehabilitation of the whole machinery of production and destruction. The world will not go backward—this opening century will see a movement forward far greater than the many millions that have gone before.

Pharmacy in the past has moved forward with or in the vanguard of scientific advancement. The foundations that have been laid in the achievements of the historic past are secure. Is it now going backward? Shall it go backward? Will the drugstore keep pace with the advancement of pharmacy—the trend of science, or will it separate from it? Will the drugstore have a place in the new made world, or will it disappear from sight?

The Drugstore That Is to Be

Every age has its demands—its own work to do. Pharmacy can never again have its Parcellus, Galen, Hanbury, Squibb, Maisch, Procter, Rice or its Hallberg—for there will never be the need for nor the place for them.

To-day we have our Kraemer, Remington, Lloyd and Beringer and they will pass away and new masters come forth to meet the newer, higher needs.

The old drug shop has passed away and the world will never call for its restoration. In its place is the New Drugstore, which is moulding and shaping itself to fill its place in the life of to-day. Out of the old that has disappeared—out of the new that now is—we may form visions of the drugstore that is to come. Faintly these visions take their shape.

The future drugstore need not be a chain store nor a trust. Its place, its worth and its success will not be measured by square feet nor acres of floor space, nor its massive buildings, capitalization nor ample stocks.

The present drugstore better than the one which preceded will in turn be supplanted by one better still. It may be an evolution of the type of thousands that exist here to-day, but it will be a store that aims at the highest standards—it will be a place of business—a commercialized pharmacy—or it cannot exist. And it will meet and conquer competition in character—not in underhand methods or cut prices. It will give a higher—a better—an ever-growing service. It will fill every need of the age in which it may live and of the humanity which it may serve.

THE DETECTION OF CANE SUGAR IN HONEY.[1]

By Charles H. LaWall.

By the above (query) I suppose is meant the detection of *added* cane sugar in honey, for it is an established fact that sucrose normally exists in cane honey to the extent of as high as 8 per cent., which is the maximum amount permitted by the standards of the U. S. Department of Agriculture.

There are no color reactions or simple chemical tests for the differentiation or distinction of any of the sugars and these are detected only by inferential tests based either upon the reducing power before and after inversion or by the optical activity under similar circumstances. As sucrose is chemically the same whether

[1] Read at the annual meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

normally existing in the honey or in the shape of cane or beet sugar and as it is the amount rather than the actual presence which decides the genuineness of the article, the only tests of value are the quantitative tests, even were qualitative tests possible, which they are not.

The best method for the determination of cane sugar is by the use of the polariscope and the use of an algebraic formula in connection with the figures obtained for the optical rotation before and after inversion, observations being made at the same temperatures.

By inversion, of course, is meant the hydrolysis of sucrose which, when heated with diluted acids, is converted into dextrose and levulose, the levulose being in excess and the mixture of the two resulting sugars therefore possessing a levorotatory power in contradistinction to the dextrorotatory power of sucrose.

As honey consists largely of invert sugar (from 50 to 80 per cent.), and as invert sugar is readily prepared from cane sugar in large quantities, it seldom happens that such a clumsy method of adulterating honey as by the addition of cane sugar direct is practised, when it is possible to convert the same sugar into invert sugar and thus simply add a sugar which is normally present in the honey. Invert sugar, like sucrose, is the same chemically, whether existing naturally or prepared artificially from sucrose, and it would be impossible to detect added invert sugar in honey were it not for the fact that in the process of inversion by any of the artificial methods, a small amount of furfuraldehyde is produced, and as furfuraldehyde is never present in genuine honey and as it can be detected in very minute amounts and with as great certainty as is the case with formaldehyde, it is customary to apply a test for the presence or absence of furfuraldehyde before deciding whether a honey is or is not genuine, even if the proportions and kinds of sugars are normal.

Such a test was years ago devised by C. A. Browne[2] and is as follows:

> Treat 5 Cc. of a 1:1 solution of the honey in distilled water, in a test tube with 2 Cc. of aniline acetate reagent (freshly prepared for the test by mixing 5 Cc. of aniline and 5 Cc. of water and adding just sufficient glacial acetic acid to make a clear solution), allowing the reagent to flow into the tube gently so as to form a separate layer upon the honey solution. If the

[2] U. S. Dept. of Agriculture, Bureau of Chemistry, Bulletin 110, p. 68.

tube be then gently agitated so as to slightly but not entirely mix the two layers a red ring or zone will be produced at the point of contact if furfuraldehyde be present, indicating the presence of added invert sugar.

Unfortunately this test is not infallible, for when pure genuine honey is heated (as, for instance, in the process of clarification when heat is sometimes used), furfuraldehyde is also formed and the test is of no value therefore unless applied to honey which has been known to never have been heated.

In conclusion I would say that it is not possible to detect cane sugar in honey in the sense of a qualitative test; that, as cane sugar is normally present in small amounts, its quantitative determination, preferably by means of the polariscope, becomes necessary; that the form in which sugar is added usually is that of invert sugar which can be readily detected in honey which has never been subjected to heat.

A RAPID ACCURATE METHOD FOR THE QUANTITATIVE ANALYSIS OF ZINC OINTMENT.[1]

By Joseph L. Mayer.

In testing some samples of Zinc Oxide Ointment recently, it appeared to me that the analytical methods now in use were too involved and time-consuming for the pharmacist; I therefore devised the following very simple and accurate process:

Into a tared porcelain crucible accurately weigh 1 gramme of the sample, heat cautiously until the material bursts into flame, allow to burn quietly until all inflammable material is consumed, then heat strongly with the Bunsen burner until all organic matter is burned off, cool and weigh.

Should difficulty be experienced in burning off organic matter, moisten with a drop of nitric acid, heat cautiously to avoid spattering, and then with the full flame as before.

Since 1 gramme of the sample is taken the residue which is oxide of zinc can easily be computed into percentage by multiplying the result by one hundred.

Of course, if necessary, this result can be checked by deter-

[1] Read before the New York State Pharmaceutical Association, June, 1913.

mining the zinc in the residue volumetrically, gravimetrically, or electrolytically and calculating to oxide.

There does not appear to be any reason why the method cannot be employed with equally good results for the analysis of Zinc Stearate Ointment. In this case the amount of stearate present could easily be calculated from the residue, which is zinc oxide.

The method, in addition to being rapid, is accurate and easily applied.

A NOTE ON AQUA CAMPHORÆ.[1]

By John K. Thum, PhG., German Hospital, Philadelphia.

Those of us who have occasion to make considerable quantities of camphor water are conversant with the shortcomings of the present official method. The method consists in dissolving 8 grams of camphor in 8 cubic centimetres of alcohol, triturating the solution with 15 grams of purified talc, allowing the greater part of the alcohol to evaporate spontaneously, continuing the trituration with distilled water to make one litre and filtering through a wetted filter.

By this method, after a few days, the preparation begins to get cloudy and shows unmistakable signs of fungus-like growth. Although the statement appears in some of the literature relating to camphor that it is soluble in water to the extent of two grains to a fluidounce, it is not true and is readily disproven; if it were true fungi would not appear, as camphor is somewhat antiseptic.

The U. S. P. states that camphor is "sparingly soluble" in water, and, as practice bears out this statement, it follows that in the present U. S. P. method for making the water practically all of the camphor remains on the filter with the talc. It seems to the writer that the combination of alcohol and camphor causes some of the talc to go into solution and as the alcohol, or the greater part of it, gradually evaporates after the lapse of time, the talc is thrown out of solution. That camphor water prepared by this method shows up clear when first made is true, but only for a short time, then, as stated before, cloudiness appears which necessitates frequent filtration. To a busy pharmacist this is an annoyance.

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[1] Read at the meeting of the Pennsylvania Pharmaceutical Association, June, 1913.

We are desirous of having at all times on hand a clear, saturated solution of camphor in distilled water and we obtain it by applying the pharmacopœial method for making chloroform water to the preparation of our camphor water. To put it concretely:

Camphor (in small pieces).....	8.0 grams.
Distilled water .....ad	1000.0 c.c.

We make four litres at a time. When our dispensing bottle needs replenishing we simply fill it from the stock bottle, first tying a piece of sterile gauze over the mouth of the stock container to prevent the camphor from going over. This water remains clear indefinitely.

That camphor water made by this method contains at all times camphor to the point of saturation can readily be determined by mixing an equal part of it with a 50 per cent. solution of magnesium sulphate when a rather copious precipitate of camphor makes its appearance.

THE SIXTY-FOURTH ANNUAL SESSION OF THE AMERICAN MEDICAL ASSOCIATION.

The meeting of the American Medical Association for 1913 held in the city of Minneapolis, June 17, 18, 19 and 20, was more successful and much better attended than had been anticipated, either by the officers of the Association or by the members of the several local committees. The registration of members aggregated 3200 and this, with the rather novel arrangement of having all of the meetings held on the University campus, insured a liberal attendance at all of the sessions of the fifteen sections of the Association.

The programme of the scientific work of the several sections was well up to the high standard previously established, and the list of papers with abstracts required a book of 168 pages to present.

As had been foreshadowed by the interest previously evidenced, the subject of medical education was freely discussed, both in and out of meetings. The report of the Council on Medical Education presented a rather comprehensive survey of the work of the Council during recent years and called particular attention to the fact that from a total of 166 medical schools in the United States in 1904, the total number has been reduced to about 110 at the end of the present college session, despite the fact that several state univer-

sities have organized medical departments during recent years. The total number of schools closed since 1907 by merger or otherwise is given as sixty-five, and the opinion is offered that this decrease in the number of medical colleges has not been to the detriment of medical education but to its advantage. It has not removed or lessened the opportunities of students to study medicine, but has resulted in giving them better opportunities. The question of medical education was also referred to by George Edgar Vincent, President of the University of Minnesota, in his address of welcome. He complimented the American Medical Association on the excellent work done under its auspices to bring about proper recognition of laboratory and hospital instruction and to call attention to the need of medical research. He also pointed out that a cheap medical education is the most expensive for the community and that the frequently made plea that individuals should have a right to a short and easy road to professional practice should not be seriously considered.

The work of the Section on Pharmacology and Therapeutics is perhaps of more direct interest to pharmacists than that of any of the other sections primarily because matters of pharmaceutical interest are usually discussed in this Section and also because of the fact that delegates from the American Pharmaceutical Association are received by this Section. This year the American Pharmaceutical Association was represented by Prof. Joseph P. Remington, Dr. Bernard Fantus, and Prof. F. J. Wulling. Prof. Joseph P. Remington, the Chairman of the delegation of the American Pharmaceutical Association, in presenting felicitations, said in part:

"The American Pharmaceutical Association sends greetings to the American Medical Association and best wishes for a most successful meeting at Minneapolis. During the last three years the national organizations have been more closely brought together through Pharmacopœial revision work, members from both organizations working in their several departments on the Ninth Revision.

"It was to be expected that differences of opinion would arise, and it is gratifying to know that during the three years of earnest discussion and official correspondence, personalities have been conspicuous through their absence. The principal debates have been on the question of scope, some of the medical members arguing for a more restricted list; others desire an extended list, but the majority of the members of the Revision Committee are undoubtedly in favor of adopting neither a restricted nor extended list, but one which they believe will be satisfactory to the largest number of practitioners in America. It will be interesting to know that about 85 per

cent. of the manuscript of the Ninth Revision is nearly finished and the work of getting it ready for the press will soon begin.

"The American Pharmaceutical Association has been very active through its branch organizations, and its own legislative committees in advancing legislation tending to control the extensive use of narcotics and in preventing as far as possible the further development of evil practices of unworthy members of both professions. It is sincerely hoped that our national bodies will continue to work in the future on lines which will draw both together and ignoring small and unimportant details and differences, will stand shoulder to shoulder in advancing legislation which shall secure to suffering humanity the greatest uplift that is possible."

This address was well received by the members of the Section, and in further discussing the scope of the Pharmacopœia, Dr. Torald Sollmann, of Cleveland, offered the following preamble and resolution:

"WHEREAS, It is desirable that the articles officialized by the Pharmacopœia of the United States should reflect the progress of therapeutics; and

"WHEREAS, Therefore the inclusion of articles in the Pharmacopœia now in progress of revision should be determined by their therapeutic merit; and

"WHEREAS, The decision of therapeutic questions should logically and in fairness be left mainly to the medical members of the Revision Committee; therefore, be it

"*Resolved*, That the section request the House of Delegates of the American Medical Association to urge on the Committee of Revision of the Pharmacopœia of the United States that the selection of articles to be included be left to the Committee on Scope, in which the medical profession has a majority representation, rather than to the Executive Committee, which represents mainly the pharmaceutical profession, and which has overridden half the changes advocated by the Committee on Scope."

This resolution was discussed at some length and was finally adopted, referred to the House of Delegates, and was later concurred in by that body.

The address of the Chairman of the Section, Dr. Ray L. Wilbur, of San Francisco, California, was devoted to a practical discussion on the teaching of therapeutics, and a paper by Torald Sollmann, of Cleveland, entitled "Yesterday, To-day and To-morrow: the Activities of the Council on Pharmacy and Chemistry," discussed the aim of the Council in bringing about a necessary change in the attitude of physicians toward materia medica products generally. He also referred to the new book on useful remedies to be pub-

lished under the auspices of the Council, and ventured the opinion that this book would go far toward bringing about a change in the relation of physicians and pharmacists.

The quality of the drugs furnished to patients was discussed in a paper by W. A. Puckner on the "Quality of Drugs Sold to Dispensing Physicians," and in a paper by M. I. Wilbert on "Carelessness in the Pharmacy as a Reason for a Restricted Materia Medica." The following preamble and resolution designed to bring about greater activity in the enforcement of existing laws relating to drugs and medicines was adopted by the Section, referred to the House of Delegates and concurred in by that body:

"WHEREAS, It has been repeatedly shown by the Council on Pharmacy and Chemistry, and by the Chemical Laboratory of the A. M. A., as well as by other investigators, that many drugs and preparations used in the treatment of diseases are of unreliable composition, through carelessness, negligence, ignorance and other reasons; and

"WHEREAS, This condition of affairs is against the interests of public health and the progress of the science of medicine; therefore it is evident that greater activity is needed in the enforcement of existing laws relating to drugs and medicines; therefore, be it

"*Resolved*, That the Section on Pharmacology and Therapeutics requests the House of Delegates of the A. M. A. to bring this matter to the attention of the proper federal and state authorities, and urge on them the need for more energetic and effective action in this direction."

A comprehensive paper on "The Physiological Testing of Ergot," by A. C. Crawford, of Palo Alto, California, was presented in abstract and will no doubt appear as a part of the proceedings of the Section. The remaining papers presented before the Section were largely of interest from a practical therapeutic point of view, and included contributions on the treatment of various pathologic conditions by the use of drugs. A symposium on physical therapeutics included discussions on hydrotherapy, the use of radium and the use of the Roentgen rays as therapeutic measures.

One of the more interesting features of the programme was a symposium on serums and vaccines in a joint meeting with the Section on the Practice of Medicine. The papers presented included a discussion of the federal control over the manufacture of serums and vaccines by Dr. John F. Anderson, of Washington, D. C.; the treatment of pneumonia by specific serums by Rufus Cole, of New York; the treatment of lobar pneumonia with par-

tially autolyzed pneumococci and pneumococcus extracts by E. C. Rosenow, Chicago; anti-streptococcus serum, by George H. Weaver, Chicago; and a report on typhoid vaccination in the Army in 1912, by Frederick F. Russell, Washington, D. C. These several papers contained considerable information of a practical character and, with the resulting discussion, constitute perhaps the most conservative statement with regard to the possibilities and limitations of serums and vaccines that has recently been presented.

The officers of the Section for the coming year are: Chairman, J. F. Anderson, Washington, D. C.; Vice-Chairman, Robert Hatcher, New York; Secretary, M. I. Wilbert, Washington, D. C.; Delegate, Ray L. Wilbur, San Francisco, Cal.; Alternate, Reid Hunt, Washington, D. C.

Dr. Victor C. Vaughn, of the University of Michigan, Ann Arbor, Michigan, was selected as the President-elect of the American Medical Association, and the next meeting of the Association will be held in Atlantic City in June, 1914.

M. I. WILBERT.

PHILADELPHIA COLLEGE OF PHARMACY.

MINUTES OF THE QUARTERLY MEETING.

The quarterly meeting of the Philadelphia College of Pharmacy was held on June 30, 1913, at 4 P.M., in the Library.

In the absence of the Secretary, Jacob S. Beetem was appointed Secretary pro tem. The minutes of the annual meeing held March 31st were read and approved. The minutes of the Board of Trustees for March, April and May were read and approved.

The Committee on Membership, Professor Charles H. LaWall, chairman, reported that the conditions were about the same as last year, and that continued efforts were being made to add to the membership of the College.

The Committee on Necrology: Professor Henry Kraemer, Chairman, reported that during the year six members had died—one honorary and five active. Obituary sketches had been published of five in the JOURNAL, and that the July issue of the JOURNAL would contain notices of Mr. Ridpath and Mr. Estlack. The following is a list of those deceased: Oscar Oldberg, Alexander H. Jones, William McIntyre, Florence Yaple, John W. Ridpath and Horace W. Estlack.

The delegates to the meeting of the Delaware Pharmaceutical Association, Professor C. B. Lowe, Chairman, reported that all the delegates appointed attended the meeting, which was held at Wilmington, June 5th. Mr. Challenger, of New Castle, presided. Reports of various committees were presented, one of the most interesting being that on "Adulterations," by H. K. Watson, of the Delaware State College. The State Pharmacy Board presented a report of their work for 1912. Delaware now exchanges certificates with Maryland, and possibly with several other States. The report advocated examination and registration by a National Board and that certificates from this Board be recognized in all the States.

The delegates to the meeting of the New Jersey Pharmacutical Association made a verbal report by the chairman, George M. Beringer. The meeting was an unusually pleasant one, the delegates being welcome and accorded every privilege, and as usual the graduates of the College presented papers and took an active part in the discussions. Professor Kraemer supplemented the report by adding that Mr. Beringer presented a report of his work as a member of the U. S. P. Revision Committee. He also presented a paper on Magma Magnesia and one on Elixir Ferri et Quinia et Strychnia Phosphatis. He said considering the amount of work accomplished in the reading of reports, number of papers read and the entertainment features, the meeting was one of the best he ever attended.

The delegates to the meeting of the Pennsylvania Pharmaceutical Association, Professor C. B. Lowe, Chairman, reported that the 36th annual meeting was held at Forest Park, Pike Co., June 24, 25, 26. The informal opening was held on Tuesday morning, at which time delegates from other associations were welcomed. The formal opening was in the evening when the Association was welcomed by Rev. B. F. Apple, of Stroudsburg. The gentleman, though 81 years of age, made a pleasing and spirited address, which captivated the audience.

The Procter Memorial Committee suggested a plan of action for pushing the matter by the American Pharmaceutical Association, and also presented photographs of a proposed monument. The report of the Committee on Trade Interests was a specially notable one. Buena Vista Springs was chosen as the next place of meeting. The officers elected were R. H. Lackey, President; Charles R. Rhodes, First Vice-President; George J. Durbin, Second Vice-

President; Edgar F. Hefner, Secretary; F. H. E. Gleim, Treasurer. W. J. Sturgeon is the new member of the Executive Committee.

The State Board of Pharmacy made an interesting and valuable report, in which it was stated that 90 per cent. of the graduates of the Philadelphia College of Pharmacy had been successful in the examinations held by the Board in the preceding year. The chairman of the Committee on Papers and Queries, Professor F. P. Stroup, presented, as usual, a large number of important papers, about 40 in all, thus keeping the Pennsylvania Association in the van of all other associations in this important work. The entertainment, as usual, was varied and enjoyable.

The President appointed the following as delegates to the meeting of the American Pharmaceutical Association to be held at Nashville, Tenn., August 18: Prof. Joseph P. Remington, chairman; Prof. Henry Kraemer, Prof. C. B. Lowe, George M. Beringer, Prof. E. F. Cook, with power to appoint three of their number as members of the House of Delegates. Professor Henry Kraemer submitted the names of five gentlemen for Honorary membership, which, according to the rules, lie over for action till the next meeting of the College.

The Registrar submitted the name of an associate member for election to active membership. The application was referred to Committee on Membership. The diploma of Mr. Schively, of the class of 1842, was presented to the College by Mr. B. C. Clapham.

Professor Henry Kraemer reported having received from Doctor Jose L. Alacan, of the University of Havana, two handsome coffee plants. The thanks of the College were rendered both the donors.

Professor Henry Kraemer presented a number of photographs and a portrait of Miss Florence Yaple (a life member of the College, and long associated in the management of the AMERICAN JOURNAL OF PHARMACY). This portrait was made from a photograph taken by Professor Kraemer several years ago and was painted by her friend, Miss Florence Newton, who made the portrait of Dr. Susan Hayhurst, presented to the College in 1911. He asked that the portrait of Miss Yaple be hung in the ladies' room of the College; so ordered.

Mr. Beringer called the attention of the meeting to the fact that at this time the Revision Committee on Essential Oils of the U. S. P. were in session at the College, and suggested we invite the gentlemen to meet the members present. This was favorably received,

and later the Dean presented Professor C. Lewis Diehl, Dr. Charles Caspari, Jr., Mr. Otto Raubenheimer and Dr. John M. Francis. The President welcomed the gentlemen, who, in turn, responded.

JACOB S. BEETEM,
Secretary Pro Tem.

ABSTRACTS FROM MINUTES OF BOARD OF TRUSTEES.

March 4th, 1913.—Eleven members present. Committee on Library reported that during the past two months 825 books were accessioned, and a number of volumes were donated: 244 persons consulted the Library. Committee on Examinations reported that Frank N. Moerk has complied with all the requirements and was entitled to a Certificate of Proficiency in Chemistry; after a ballot had been taken it was ordered that a certificate be awarded. The resolutions prepared in memory of William McIntyre were read, and, on motion, it was ordered that they be entered on the minutes and an engrossed copy be sent to the family.

April 1st, 1913.—Eleven members were present. A communication was received from the Secretary of the College announcing the election of officers for the ensuing year and the election of three trustees for three years. This being the time for the reorganization of the Board, Mr. George M. Beringer was re-elected Chairman, Mr. Walter A. Rumsey, Vice-Chairman, and Mr. Jacob S. Beetem, Registrar for the ensuing year.

Committee on Library reported 256 books accessioned during the month and a number of volumes donated; 197 persons had consulted the Library. The Special Committee on Educational Matters reported verbally, and the subject was left in their hands.

The Standing Committee for the year were appointed with the following members as chairmen: Property, Howard B. French; Library, Samuel P. Sadtler; Museum and Herbarium, O. W. Osterlund; Finance, Howard B. French; Supplies, H. K. Mulford; Accounts and Audit, C. A. Weidemann; Instruction, George M. Beringer; Scholarships, Joseph P. Remington; Examination, W. L. Cliffe; Theses, Joseph W. England; Discipline, Howard B. French; Commencement, Walter A. Rumsey; Announcement, Samuel P. Sadtler; Alumni, Joseph W. England; Appropriations, the chairmen of all committees empowered to make expenditures, with the Chairman of the Committee on Finance, the Chairman of the Board and the Treasurer.

Communications were received from all upon whom the degree of Master in Pharmacy will be conferred, expressing their appreciation of the honor.

Membership Committee reported favorably on the application for active membership of E. G. Eberle, of Dallas, Texas, and Charles C. Sniteman, of Wisconsin, whereupon a ballot was taken and they were unanimously elected.

April 22nd, 1913.—A special meeting of the Board was called by written request of five members thereof. The chairman explained the reason for the call was due to articles published in one of the drug journals of recent date. Several of the members who could not be present expressed their views in writing, and a lengthy discussion followed, participated in by a number of those present; the matter was referred back to a special committee with power to act.

May 6th, 1913.—Seventeen members were present. Professor Moerk was invited to be present during the discussion on the report from the Committee on Instruction. The committee had held many meetings during the winter and spring, and earnest consideration had been given to the question of improving the curriculum and working out methods by which the student shall obtain the best results from the advantages which the courses of instruction afford. The committee think it inadvisable to make any change in the three-year course, as given since 1895. The desirability of increasing the total number of hours of instruction in the three years' course of the College to at least 1800 hours was reported upon. To accomplish this a number of changes have been necessary and were recommended for consideration. The proposed changes were read by sections and after a lengthy discussion were adopted with some modifications. The recommendations were as follows:

First.—Eliminating the supplementary course and making it part of the regular course. Adopted.

Modified Roster referred back to Committee with power to act.

Second and Third.—Recommend continue course of special lectures. Adopted.

Fourth.—Special lectures during the course to be approved by the Committee on Instruction. Adopted.

Fifth and Sixth.—Department of Bacteriology, Hygiene, Urinology and Serology. Adopted.

Seventh and Eighth.—Compensation to Professor of Bacteriology was referred to Finance Committee. The fee of the optional course for special students was fixed at twenty-five dollars.

Ninth.—Committee on Instruction to confer with the Professor of Bacteriology relative to equipment. Adopted.

Tenth.—The sub-committee to co-operate with students in the interim between college courses. Adopted.

Eleventh.—Outlines a plan covering deficiencies. Adopted.

Twelfth and Thirteenth.—Improvements in one of the laboratories was referred to Committee on Property.

Fourteenth.—Professor Kraemer's selection of Mr. P. F. Fackenthal as Instructor in Pharmacognosy was approved.

Fifteenth.—Professor Kraemer was authorized to engage a student assistant upon terms suggested.

May 13th, 1913.—Adjourned meeting. Sixteen members were present.

The Committee on Instruction made a supplemental report recommending that the changes necessary in the Roster be approved. Adopted. Also recommending that Professor C. B. Lowe be made Medical Examiner in the Department of Physical Education, and that Mr. W. Ward Beam be made Director of the Gymnasium and Instructor of Physical Training. Adopted.

Committee on Examinations reported the names of those who had successfully passed the examinations for the degree of Doctor in Pharmacy, and also for those for the degree of Pharmaceutical Chemist; a ballot being taken, they were declared elected to receive the degree.

The names of those who were entitled to receive prizes were then read, and approved, and the chairman appointed various members of the Board and Faculty to present the prizes at the coming commencement. Mr. French reported that the Hon. William E. Humphrey, of Seattle, Washington, would speak at the Commencement Exercises; that Rev. Edwin T. Carson would offer the prayer, and that Rev. David M. Steele would deliver the Baccalaureate sermon to the graduating class in St. Luke's Episcopal Church.

The Committee on Membership reported favorably on the application of Mr. John R. Rippetoe, of New York City, for active membership; a ballot being taken, he was unanimously elected.

NOTES AND NEWS.

HISTORICAL MEDICAL MUSEUM FOR LONDON.—The ceremony of opening the Historical Medical Museum organized by Mr. Henry S. Wellcome, was performed on June 24th by Dr. Norman Moore, President of the Section on History of Medicine of the forthcoming International Medical Congress, and the new Institution received the benediction of Sir Thomas Barlow, President of the London Royal College of Physicians and of the International Medical Congress, Sir Frederick Treves, Sir Rickman Godlee, President of the London Royal College of Surgeons, and Sir Francis Champneys, President of the Royal Society of Medicine.

The idea of forming a museum illustrating the history of the healing art was first conceived and organized by Mr. Wellcome several years ago, and a remarkable collection of rare and curious objects of historical interest connected with medicine, surgery and the allied sciences has now been brought together from all parts of the world.

Dr. Norman Moore in the course of his opening address said the museum would be a most important addition to the studies of the International Medical Congress and would deeply interest a great many of the 7,000 medical men who were expected to attend. He reviewed the formation of earlier museums, all of which are relatively recent creations and usually developments from libraries. The museum he that day formally declared open was the first established in England to illustrate the history of medicine and it might justly be regarded as a further step in the establishment of the subject as a regular study.

In responding to a vote of thanks, Mr. Wellcome expressed his indebtedness for kind services and assistance given by Sir William Osler and many other eminent men and also institutions whose names he mentioned. He regarded the museum as at its very beginning and intended the present collection to form the nucleus of a permanent Historical Medical Museum in London.

It was his intention to found in London a Bureau of Scientific Research and to appoint as Director-in-Chief Dr. Andrew Balfour, who for nearly twelve years had rendered such fruitful services as Director of the Wellcome Tropical Research Laboratories at Khartoum, Sudan.